

Exploration and economic evaluation of Au, Ag and base metals in District Swabi, Pakistan

Sajjad Ahmad¹; Liaqat Ali²; M. Tahir Shah²; Jehangir Khan² and Awais Ahmad²

¹*Department of Geology, University of Peshawar*

²*National Centre of Excellence in Geology, University of Peshawar*

sajjadahmad88@hotmail.com

Abstract

District Swabi is located in the eastern part of Peshawar basin with wide spread streams mainly along River Indus. These streams transport a large quantity of clay, sand, silt and gravel and over a long distance. Field work was conducted in district Swabi in order to collect stream sediments and pan concentrate samples for better understanding of exploration in these areas. Field panning method was adapted for samples collection and a total of seventeen pan concentrate and twenty stream sediment samples were collected from the selected sites. Chemical analysis for Au, Ag and base metals was carried out using Atomic Absorption Spectrometry (AAS).

Results of pan concentrate samples indicate Ag, Cu, Pb, Zn, Ni, Cr Co, Cd and Mn which ranges in pan concentrate samples from 0 to 4 ppm, 0 to 350 ppm, 0 to 31 ppm, 2 to 63 ppm, 0 to 35 ppm, 0 to 69 ppm, 0 to 47 ppm, 0 to 6 ppm and 51 to 313 ppm respectively. Results of statistical analysis show that in pan concentrate samples, the highest concentration (ppm) of Au is 31.8, 9.0 and 3.0 from Bada khwar, Zarobai and Shewa Khwar. While the lowest concentration of Au is 0.003 ppm in Aadina khwar. Mean concentration of Au in pan concentrate samples is 2.7 ppm. In stream sediment samples Ag, Cu, Pb, Zn, Ni, Cr, Co, Cd and Mn ranges from 0.05 to 4ppm, 0 to 104ppm, 0.02 to 11ppm, 0.01 t to 38ppm, 0.02 to 653ppm, 0.02 to 45ppm, 0.02 to 9.3ppm, and 0.05 to 7 and 0.02 to 343ppm respectively. Results of all stream sediment samples shows that Au concentration is low in majority of the samples with values of less than 1 ppm with mean value of 0.3 ppm. Correlation matrix indicated that Au shows good correlation with Cu and Co in stream sediments, while in pan concentrate Au is not showing any association with other elements. Similarly Cu shows good association with Zn in both stream sediments and pan concentrate. Lead shows good correlation with Ag, Ni and Cd in pan concentrate, While Pb is showing good correlation with Zn, Cr and Cd in stream sediments. These two sampling media are showing different signatures for different elements.

From the results, it is concluded that anomalous concentration of Au is found in district Swabi with highest in Bada khwar, followed by Zor khwar and Shewa khwar near Naranji village. The grade of Au in these areas is high enough to be called economic placers. However, due to small scale and limited extent, these placers can't be extracted on commercial scale.